

nected with the growth of the University and its colleges, as well as of Eton College. Four years later, in 1890, "The Life and Letters of Adam Sedgwick" was published by J. W. Clark, in collaboration with Prof. T. McKenny Hughes.

As an antiquary, Clark was specially concerned with libraries, and he was an acknowledged master in matters relating to their furniture and fittings. Some of his results in this line of investigation were published in 1901, under the title of "The Care of Books." His interest in libraries took a practical shape in the work he devoted to the University library, as shown, for instance, by his success in raising, within the last few years, a sum of 20,000*l.* in order to place the finances of that institution on a more satisfactory basis. The Fitzwilliam Museum is another institution to which Clark devoted much of his time, and to which he rendered innumerable services. He was a member of the council of the Cambridge Antiquarian Society for forty-nine years, and he read more than fifty papers at meetings of the society.

As a zoologist, Clark's principal interests were connected with marine mammals, as is exemplified by the fine collections of Cetacea, Sirenia, and Pinnipedia which he made for the museum of zoology. His best-known zoological publications refer to these groups of animals, and special reference must be made to his papers on eared seals, published in the Proceedings of the Zoological Society in 1873 to 1884.

During the last nineteen years of his life, Clark was fully occupied by the duties devolving on him as registrar of the University. In this capacity his extraordinary knowledge of the early history of Cambridge and of its forms and ceremonies, his ability in the care and publication of documents, and his acquaintance with procedure were all of the greatest service to the University.

It is difficult to speak dispassionately of Clark's singularly attractive personality, and of the ready sympathy he showed with all sorts and conditions of men.

Advancing years did not take from him the capacity of making new friends, many of whom were chosen from among the younger members of the University.

"Gracious and apt to win the youngest heart,
Yet keep the oldest true!"

These words, written of him by his friend, Mr. A. C. Benson, will express the affectionate regard felt for him by many with whom his loss leaves a blank that cannot be filled. SIDNEY F. HARMER.

PROF MAURICE LÉVY.

IN NATURE of last week the death was announced of M. Maurice Lévy, sometime inspector-general of the Ponts et Chaussées, and professor at the Collège de France. An interesting account of Lévy's investigations in pure and applied mathematics and mechanics is given by M. Émile Picard in an address to the Académie des Sciences, read on October 3 (*Comptes rendus*, cli., 14).

In infinitesimal geometry, Lévy obtained the doctorate in 1867, for an essay on orthogonal coordinates embodying several new and important results. His investigations in this subject also included the study of spiral surfaces. His treatise on graphical statics, of which the first edition appeared in 1874, practically initiated the study of this important branch of applied mathematics in France. The notes at the end of the first edition really constitute original papers on the tension of elastic rods, and on the systems of maximum strength with given amount of material; in them the author discusses the advantages of structures without superfluous connections. A second and en-

larged edition appeared in due course, and the completion of a third edition has been unfortunately cut short by Lévy's recent death.

The subject of elasticity occupied a large share—perhaps the main share—of Lévy's attention. After he entered the École polytechnique in 1856, at the age of eighteen, he indicated a new and simple method of investigating the resistance of continuous beams. The problems presented by systems, one of the dimensions of which is small compared with the others, greatly interested him, and a long memoir was published by him on the flexure of elastic plates. M. Picard speaks in high terms of the ingenuity and ability displayed in this essay, while remarking that a more complete solution of the difficulties occurring in this problem is to be sought elsewhere.

A second problem in elasticity was afforded by the stability of rods or prisms under end-thrust, and Lévy extended the investigation from straight to circular rods, obtaining extremely interesting conditions of stability by means of an analysis involving elliptic functions. To M. Lévy is assigned the credit also of obtaining for the first time the general equations for ductile bodies strained beyond the limits of elasticity, thus responding to the question put by Saint Venant, arising out of Tresca's experiments.

Hydrodynamics formed the subject of Lévy's second paper, dealing with rectilinear vortex motion. In this, the author took a leaf out of Cauchy's theory of optical dispersion in his application of the higher differential coefficients in studying the mutual action of two vortices.

A development of a more practical character was M. Lévy's investigation of the equilibrium of earth and the strength of masonry supporting walls. Starting with the laws of friction, Lévy found the differential equation of the lines of rupture in limiting equilibrium, and showed that, contrary to Coulomb's results, the surfaces of rupture for a prismatic mass of earth are not in all cases planes parallel to the edges of the prism.

It will thus be seen that M. Lévy played an important part in applying analytical methods to the solution of problems of practical interest, and his works constitute a heritage from which workers in applied science cannot fail to benefit greatly.

NOTES.

THE council of the Royal Scottish Geographical Society has resolved to award the society's medal to Prof. James Geikie, F.R.S., for his numerous contributions to geographical research and his great services to the society; and the Livingstone gold medal to Sir John Murray, K.C.B., F.R.S., in recognition of his oceanographical work, and more particularly in commemoration of the completion of the bathymetrical survey of Scottish fresh-water lochs.

WE regret to see the announcement of the death, on October 14, of Dr. Sydney Ringer, F.R.S., at seventy-six years of age.

ACCORDING to a Reuter message from Santiago de Chile, official returns show that the world's consumption of nitrate during the past year amounted to 43,996,966 quintals, an increase of 8,000,000 quintals as compared with the previous twelve months.

PROF. HOWARD C. BUTLER, of Princeton, has just returned to that University with an encouraging report of the archæological expedition he has been directing at Sardis, in Asia Minor. The discoveries include a part of the pavement of the ancient city, and the substructure of a large temple of the fourth century B.C. In the necro-

polis across the river from the city the explorers have discovered fragments of statuary and many gold ornaments of much beauty.

THREE members at least of the Yale faculty have lately returned from exploring tours which have occupied them during the long vacation. Prof. C. Schuchert, curator of the Peabody Museum, has investigated the geological formations of southern Labrador, and brought back a ton of specimens. Prof. R. S. Lull has spent several months in Europe studying mainly the European equivalents of the American dinosaurs. Mr. G. G. MacCurdy, curator of the anthropological collection, has been engaged in researches in the Indian antiquities of southern Mexico.

THE Home Secretary has appointed a committee to consider the organisation for rescue and aid in the case of accidents in mines, and to frame proposals for the making of an Order or Orders under the Mines Accidents (Rescue and Aid) Act, 1910. The members of the committee are:—Mr. C. F. G. Masterman M.P. (chairman); Mr. R. A. S. Redmayne, H.M. Chief Inspector of Mines; Mr. W. N. Atkinson, H.M. Inspector of Mines; Mr. E. M. Hann; Mr. W. C. Blackett; Mr. John Wilson, M.P.; and Mr. John Wadsworth, M.P. The secretary of the committee is Mr. A. Maxwell, of the Home Office.

IN a letter published in the *Times* of October 17 Mr. J. Reid Moir, of Ipswich, announced his discovery of worked flints beneath undisturbed deposits of Crag in the neighbourhood of Ipswich and elsewhere in eastern Suffolk. The flints occur on the eroded surface of the London Clay, at the base of Pliocene deposits, and associated in some cases with phosphatic nodules and fossil bones. It is inferred that the ancient clay surface was inhabited by "pre-Crag man," whose implements, on submergence of the land beneath the Pliocene sea, became covered with Red Crag. The handiwork on the flints is of a more advanced character than that of the eoliths. Two types, at least, of the early East Anglian flints may be recognised; and it is notable that though they must be, if Pliocene, very much older than the Great Ice age, some of them exhibit on their worked surface deep striæ suggestive of glacial action.

IN a letter to the Press, Lord Braye and Mr. Frank Hedges Butler state that it is proposed to erect a pillar as a memorial to Percy S. Pilcher, who was killed at Market Harborough on September 30, 1899, while making a flight with his soaring machine or *aéroplane*. Pilcher was the first Englishman who put into practice the project of gliding through the air with rigid wings, and he had the intention of propelling with a motor the machine he had made. Many who knew him and appreciated his self-devotion and zeal in promoting aviation may like to contribute to the proposed memorial, near the spot where he fell. Subscriptions should be sent to the Pilcher Memorial Fund, Messrs. Barclay and Co. (Gosling Branch), 19 Fleet Street, E.C.

THE name of Thorvald Nicolai Thiele, professor emeritus in the University of Copenhagen, has been before the astronomical public for many years, and by his lamented death on September 26 science has lost an able and original worker distinguished in several branches of natural knowledge. As a pupil of D'Arrest and as director of the Copenhagen Observatory he gave much, but not undivided, attention to astronomy, and was known for his careful discussion of double-star observations, and particularly for his criticism of Otto Struve's measures. The problem of the theory of errors in its many applications interested him, and he will be remembered for his dis-

cussion of special cases of the problem of three bodies. Outside astronomy he wrote much on insurance problems and statistics connected with tables of mortality. On these subjects he was a recognised authority, and on account of his pre-eminence was one of the few foreigners elected into the Institute of Actuaries. As a teacher he preferred to lecture on the more abstruse problems of astronomy, and never attracted a large class; consequently, his pupils were few and his influence small in comparison with his reputation, but those who were willing to penetrate deeply found in him an encouraging and illuminating master.

THE Board of Agriculture is understood to have applied to the commissioners appointed under the Development Act for an annual grant of 50,000*l.* for the purpose of research work in agriculture and for giving technical advice to farmers. A number of agricultural institutions have sent in applications for financial help, but the Board and two of the commissioners—Messrs. A. D. Hall and Sydney Webb—are engaged on a comprehensive scheme that shall ensure the best use being made of the present material. The Board has appointed a special advisory committee, including the Duke of Devonshire, Lord Reay, Sir Edward Thorpe, Dr. Dobbie, Mr. S. U. Pickering, Prof. J. B. Farmer, Lieut.-Colonel Prain, Drs. Teall, Harmer, MacDougall, and Wilson, and Messrs. Davies, Middleton, Staveley-Hill, and Stockman to help generally in the work. Details of the scheme are not yet available. The occasion is a critical one for agricultural science. The amount of money is considerable, and much will be expected in return for it; if those engaged in agricultural research can justify its expenditure they will be rendering good service, not only to agriculture, but to science in general.

NOMENCLATURE occupies a necessary part of scientific activity, and in no branch of science are the difficulties of nomenclature so great as in zoology. The greatest of these difficulties is occasioned by the rules of priority, since if these were strictly applied, many familiar names would fall into disuse, and great loss of time, misunderstanding, and trouble would result. The British Association and the eastern branch of the American Society of Zoologists have recently appealed for support in a movement to exempt animal names of long standing from change under the rule of priority, and have presented a proposition on the subject to the Commission on Nomenclature of the International Zoological Congress. This commission has just issued its triennial report, the chief interest of which lies in a reference to this matter. The secretary (Dr. C. W. Stiles, Smithsonian Institution, Washington, D.C., U.S.A.) now asks all zoologists to send him a list of 100 generic names (with their authors' names) for consideration in connection with this proposition by November 1, together with a list of standard textbooks used in zoological or palæontological courses of study. Specialists are also asked to furnish a list of 100 type-species, with full references to their names as determined by Art. 30 of the international rules. All zoologists who wish to preserve the older nomenclature would do valuable service by sending in such lists without delay.

THE *Times* of October 7 contains an interesting account of recent Norwegian explorations in Spitsbergen carried out by an expedition under Captain Gunnar Isachsen, which returned to Christiania on September 18 last. The chief land-work of the expedition was done in the north-western part of the main island, the most striking result being the discovery of a not long extinct volcano and hot-

springs in Bock Bay, a branch of Wood Bay (not Wijde Bay, as first reported). When the brief announcement of this discovery first reached Europe two months ago some doubt was felt as to the recentness of volcanic action in this quarter, but the details now given seem to prove that the volcanic cone is at any rate of Quaternary age and later than the general glaciation of the region. The cone, about 1650 feet high, is described as consisting partly of lapilli; it occurs in lat. 78° (? 79°) $28'$ north, and long. $13^{\circ} 28'$ east (Greenwich), in the vicinity of a north-south fault, which brings Devonian sandstones into juxtaposition with granite. The expedition encountered unusual and difficult ice-conditions, and reports that Bell Sound, in the south-west of the island, was already blocked up by ice toward the end of August, and that hunting sloops are now there frozen up. The weather was very fine until the middle of August, but afterwards there was scarcely one clear day in the western part of Spitsbergen. The large Geological Congress party that visited Ice Fiord under the leadership of Prof. G. de Geer early in August are evidently to be congratulated on their good fortune in having chanced upon the finest weather of the season.

In *Travel and Exploration* for October Mr. A. de C. Sowerby, in the service of the United States National Museum, describes the exploration of a hitherto little known district in China, the country drained by the Fen-ho, a large tributary of the Yellow River, running north and south through the western part of the Shansi Province. He was successful in procuring a number of new or uncommon specimens, such as moles, polecats, striped hamsters, pikas, and other quadrupeds, but there were practically no birds except bustards, crows, and larks. Sport is abundant; and Mr. Sowerby, who was accompanied by his wife, seems to have been well received by the people.

THE increasing importance of the museum of the University of Pennsylvania has encouraged the director, Mr. G. B. Gordon, to commence the issue of a quarterly journal, of which we have received the first number. The past history and condition of the museum, and several new and interesting acquisitions, have been here described by the sectional officers. It illustrates the liberality of American citizens towards scientific institutions, and the value which they attribute to museums as factors in educational work, that the director now appeals, with confident hopes of success, for the collection of an endowment fund which will give an annual income of seventy-five thousand dollars, which will, it is estimated, meet immediate requirements.

In the September number of the *Quarterly Journal of Microscopical Science* (vol. lv., part iii.) Mr. A. M. Carr Saunders and Miss Margaret Poole discuss the development of *Aphysia punctata*, with special reference to the origin of the kidney, heart, and pericardium, concerning which very different opinions have been expressed by previous writers. This paper illustrates well the great accuracy in the determination of cell-lineage which is expected of the modern embryologist, and by which alone such problems can be solved. The necessity for such accurate observation is also clearly brought out in a short controversial paper, published in the same number, by Prof. Hubrecht, who endeavours from the study of very early stages in the development of *Galeopithecus* and *Tarsius* to demonstrate the untenability of Mr. Assheton's theory of the hypoblastic origin of the mammalian trophoblast. The extremely early segregation of the trophoblast cells in the types referred to certainly seems to afford strong support to Prof. Hubrecht's contention.

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IN the *Centralblatt für Bakteriologie, Parasitenkunde, &c.* (Originale Band 53, 1909), Dr. C. Elders describes and figures a trypanosome found in the blood of a patient in Sumatra. It was observed that at the beginning of the rainy season the Javanese coolies on a rubber plantation situated near the edge of the virgin forest often suffered from a sickness characterised by "continuous, atypical attacks of fever, with painful enlargement of the spleen, liver, and lymphatic glands, sometimes with oedema pedis, often with aches in the head, back, and limbs, and always with increase of the large mononuclear leucocytes." It was in a smear of blood from one of these patients that a single specimen of a trypanosome was found, which appears to differ in its characters, and especially in its small size (8μ in length), from the African *Trypanosoma gambiense* or the Brazilian *T. (Schizotrypanum) cruzi*, of which an account was given recently (August 4) in NATURE. Should this discovery be confirmed, this species (which is not yet named) will be at least the third distinct species of trypanosome parasitic on human beings.

A MEMOIR entitled "Flagellaten-studien," by M. Hartmann and C. Chagas, in the *Memorias do Instituto Oswaldo Cruz*, vol. ii., part i., is a very important contribution to the cytology of the Flagellata. The authors have studied the relations between the nuclear and flagellar apparatus, both in the resting condition and during mitosis, in a number of species of this class of Protozoa, and they distinguish four types of flagellar insertion, as follows:—(1) the flagellum takes origin directly from the centriole contained in the nucleus (Rhizomastigina); (2) the flagellum arises from a basal granule or secondary centriole, connected by a filament or rhizoplast with the primary centriole in the nucleus (Protomonadina and Phytomonadina); (3) as in (2), but the basal granule of the flagellum is connected with the centriole of a special kinetic nucleus, and the organism is binucleate (trypanosomes and allied forms); (4) the basal granule (secondary centriole) of the flagellum is connected by a rhizoplast with a centriole of the third order, lying outside the nucleus altogether, and distinct from the primary centriole contained in the nucleus (Euglenoidina). A natural classification of the Flagellata is put forward, based principally on the above-mentioned differences of structure. In this connection it may be mentioned that, as pointed out by Minchin, the two primary subdivisions of calcareous sponges, in the "natural" classification of this class, also exhibit, amongst other characteristic points of difference, distinct types of flagellar insertion in the collar-cells.

THE nomenclature of some of the species indigenous to or visiting the United Kingdom is discussed by Dr. Hartert in the October number of *British Birds*. Among other items, we are told that the thrush "must henceforth be called" *Turdus philomelos*, while the redwing is to be known as *T. musicus*. Nevertheless, in the recently published "Guide to the British Vertebrates in the British Museum" the latter name is retained for the thrush, as is *Turdus iliacus* for the redwing.

IN the Transactions of the Lincolnshire Naturalists' Union for 1909 Mr. G. W. Mason completes his list of the Lepidoptera of the county, while Messrs. Thornley and Wallace continue their synopsis of the local Coleoptera, dealing in this instance with the family Staphylinidae. In the presidential address we are informed that measures were to be taken for a malacological survey of the county with the view of publishing a complete list of the land and fresh-water molluscs.

DESPITE the usual insufficiency of funds, supplemented in this instance by an inadequate staff, lack of space, and

absence of proper show-cases, the Rhodesia Museum at Bulawayo is stated in the report for 1909 to be making continued and in some respects rapid progress. A considerable amount of original research was carried out during the year by various members of the staff. The report concludes with an appendix on the gold-bearing rocks of Rhodesia, and a second on the minerals of the district, both by Mr. A. E. V. Zealley.

GREAT credit is due to the staff of the Exeter Museum for the rapidity with which they have prepared and arranged for public exhibition the fine series of about 4000 species and 20,000 specimens of land-shells received towards the latter part of 1909 as a bequest from the late Miss Linter. According to the terms of the will, the collection was to be made accessible to the public within a specified period, and this heavy task has been successfully accomplished. Lack of space prevented, however, the whole collection being shown at once, and it has accordingly been arranged to exhibit it in sections. In the October issue of the *Museums Journal* Mr. Rowley describes the manner in which this was done, and likewise the methods of mounting, which he thinks may prove useful to other museums.

WHILE Great Britain has produced many brilliant examples of self-educated men who have won for themselves more or less distinguished positions in science, Ireland, according to the October number of the *Irish Naturalist*, can lay claim to only one such hero of the highest type. This was Samuel Alexander Stewart, who was born in Philadelphia on February 5, 1826, whence he came in 1837 with his father to Belfast, where he eventually worked as a miller. Details of his life and work are recorded in two separate articles in the serial quoted, the former being described by the Rev. C. H. Waddell and the latter by Mr. R. L. Praeger. Most of his papers were devoted to botanical subjects, although local zoology and botany likewise claimed a share of his attention. Mr. Stewart died on June 15 last as the result of a street accident.

THE relation of palæobotany to plant-phylogeny forms the subject of an article by Prof. Penhallow, of McGill University, in the October number of the *Popular Science Monthly*. Although considerable progress has been made in the matter of tracing the descent of plants through the geological ages, many gaps remain to be filled. The bryophytes, for instance, which, from their low organisation, ought to date at least from the Silurian, are unknown before the later Tertiary; in this instance the deficiency in their past history may perhaps be attributed, at least in part, to the "imperfection of the geological record," and if this be so the need of caution in making generalisations in this and other cases is self-evident. In conclusion, the author observes that "if palæontology teaches us anything, it is that each great phylum, as well as its various subdivisions, finally reaches its culmination in a terminal member from which no further evolution is possible. But that from some inferior member, possessing high potentialities, a side line of development arises." In an earlier paragraph it is stated that although evolution is still in progress, the possibilities of its continuation are steadily diminishing, and will eventually come to an end.

IN part i. of vol. xli. of *Travaux de la Société Impériale des Naturalistes de St. Pétersbourg* Mr. K. Derjugin gives a summary of the contents of a forthcoming memoir on the fauna of the Kola Fjord, in the Arctic Ocean, based on the survey carried on by the yacht *Alexander Kowalevsky* during the summer of 1908. The investiga-

tions were carried on by dredging and surface netting, especial attention being directed to the mouth of the fjord, into which both the Kola and the Tulima discharge, and the line of division between the fluvial and marine faunas determined. The interesting forms included the isopod *Limnoria liguorum*, the mollusc *Xylophaga dorsalis*, and certain bryozoans, such as *Loxosoma* and *Stomatopora*, while the plankton contained a rare and remarkable type of *Sagitta*. In the same issue Mr. W. Schitz directs attention to the northward extension of the range of blue roller and the thicknee. Nests of the former were observed during the past summer in the governments of St. Petersburg and Novgorod, where they had never previously been seen, while in the summer of 1909 the latter bird was noticed near Lake Celligner, in the government of Twer.

MESSRS. JOHN WHELDON AND CO., 38 Great Queen Street, have recently issued a catalogue of general and economic botanical publications, including a few early herbals and works of Linnæus.

THE report for 1910 of the Lichen Exchange Club of the British Isles contains the report of the secretary, Mr. A. R. Horwood, and notes on critical specimens. Two species new to science are recorded under the genera *Lecidea* and *Arthopyrenia*.

THE Department of Lands in New Zealand is responsible for the management of the State nurseries and plantations and for the operations connected with scenery preservation, for which separate reports for the year 1909-10 have been published. The output of five nurseries amounted to 12,000,000 young trees, of which 8,000,000 were planted, largely by prison labour, on seven plantations. It is surprising to find that nearly all of these are European trees, chiefly the larch, *Pinus laricio*, the spruce, and *Pinus ponderosa*; of the eucalypts, *Eucalyptus Stuartiana* has proved to be a fast grower and is being planted, while the only reference to indigenous conifers states that, owing to failures, it has been decided to discontinue raising plants of *Podocarpus Totara*. It is also noted that deciduous trees and mixed plantations have for the most part proved unsuccessful. The report on scenery preservation indicates that additional areas amounting to 1500 acres were reserved during the year.

A VOLUME (Publication No. 129) emanating from the Carnegie Institution of Washington is devoted to an account of field observations near the desert laboratory at Tucson, Arizona, and experimental cultures in connection with the conditions of parasitism in plants. Dr. W. A. Cannon has discovered parasitism, apparently facultative, in two species of *Krameria*, a genus assumed to be autotrophic. The species, *Krameria canescens*, was found attached to several hosts, most frequently to *Covillea tridentata*, probably on account of a similar growth habit. The experimental work conducted by Dr. D. T. Macdougall was directed towards inducing dependent nutrition by the insertion of prepared slips into a host plant. The selected hosts were succulents, as *Opuntia*, *Echinocactus*, and the "xeno-parasites"—to use the author's name—were species of *Cissus*, *Agave*, and others. In the more successful cultures, the xeno-parasites formed roots and showed some degree of development for a year or longer. It was found that a superior osmotic activity on the part of the parasite is an essential. The pamphlet closes with a discussion on the origination of parasitism.

WE have received from Mr. E. Leitz a booklet on "Some Hints on the Use of the Sliding Microtome," which contains a good description of the operations of

imbedding an object in paraffin, trimming the block, making the "ritzer" lines on one face of the block, and cutting it into sections. The causes of curling, splitting, and wrinkling of the sections, and of sundry other troubles which confront the beginner, are pointed out and the remedies given. Most workers use xylol after dehydration of the tissue to replace the alcohol and to act as the paraffin solvent, but the author advocates the use of toluene; he also recommends dammar as a mounting medium in preference to balsam.

AN anonymous contributor to *Symons's Meteorological Magazine* for September communicates an article on "The Meteorological Outlook in South Africa." He points out that this pre-eminent vantage ground for the study of that science has not been utilised as it might have been, and expresses the hope that the new Union Parliament will favourably consider the matter. There are only some half-dozen of the more important stations, and some of these are poorly equipped; in nearly all cases the sites are not satisfactory, and have been chosen with a view to astronomical observations, and none can hope to undertake good magnetical work. A single service for the whole country is advocated, instead of separate services for each State as at present. The writer recommends the establishment of a series of first-order observatories suitably distributed geographically, e.g. in one line from Durban to Port Nolloth, and in another line from Bulawayo to East London; also a systematic discussion of all the observations at present in existence, and particularly of the anemometric records kept at some of the ports. Attention is also directed to the necessity of uniformity of times of observation and of the measures used in publications.

THE results of the Italian aeronautical experiments near Zanzibar during the last week of July, 1908 (the period selected for international balloon ascents), are published in the *Annali* of the Central Meteorological Office (vol. xxx., part i.). The Italian Government lent the cruiser *Caprera* for the purpose, and deputed Prof. L. Palazzo to superintend the work. The weather during the whole of the time was unfortunately unfavourable; only two successful ascents were made with registering balloons, and ten ascents of pilot balloons could only be observed in the lower strata of the atmosphere. Some useful observations were, however, made with the latter, and showed that the wind direction during the summer monsoon was practically southerly, with more or less easterly components. On July 30 the registering balloon reached an altitude of 4940 metres; at 1500 m. and 3500 m. a small inversion of temperature was observed, both in ascending and descending. The lowest temperature, -2.8° C., was registered at 4690 m. during the descent. In the ascent of July 31 the altitude of 6630 m. was reached; the minimum temperature, -12.0° C., occurred at 6610 m., during the descent. There was a tendency to an inversion at 3500 m., and a more decided one at about 6200 m., both in ascending and descending.

IN the October number of the *American Journal of Science* Mr. A. McAdie directs attention to the urgent necessity of replacing the present bewildering diversity of systems of notation in meteorology by an international system. The work now in progress with the help of kites and the rapid strides which the art of aviation is making both point to an early extension of our knowledge of the properties and motions of the atmosphere, and it is important that the results should be expressed in a form readily understood by all. With Dr. W. N. Shaw, the

author advocates the expression of pressures in terms of the barie of one million dynes per square centimetre, which is the pressure at a height of 106 metres in the atmosphere. Temperature to be expressed on the absolute scale, reckoned from -273° C.; humidity in terms of the weight, in grams, of water vapour in 1000 cubic metres of air; and the direction of the wind in degrees from the north towards the east.

THE *Revue scientifique* for October 1 reproduces a lecture given by Prof. Jean Becquerel on modern ideas as to the constitution of matter. Although no mathematical symbols are used, the author succeeds in giving a clear and interesting account of the steps by which, since the discovery of the kathode rays, physicists have been driven to the conclusion that, like matter, electricity is atomic in constitution, that the kathode rays are, in fact, streams of atoms of negative electricity. In virtue of their motion these atoms possess an inertia equal to one two-thousandth part of that which an atom of hydrogen would possess, and it seems possible that they form one of the primordial elements out of which matter as we know it is built. How each atom of matter is constructed remains to be discovered, but if the above view is correct it is no longer possible to conceive of the atoms of the chemists as immutable; we must, in fact, turn alchemists.

WE learn from an article in *Engineering* for October 14, dealing with the annual report of Lloyd's Register of Shipping, that the Diesel oil engine is now being fitted to three fairly large vessels being built on the Continent under the supervision of the surveyors of Lloyd's Register. One set is being constructed on the older principle of the four-stroke cycle with single-acting cylinders, and will be of about 450 indicated horse-power. A two-stroke cycle, in which the reversal is effected in the engine itself, the crank-shaft being directly coupled to the screw-shaft, has been successfully adopted. A single-acting set on the two-stroke cycle is being fitted to a twin-screw vessel, the power being about 900 indicated horse-power on each shaft. The third set is being made on the two-stroke cycle double-acting system, each cylinder providing two impulses per revolution. This will also be fitted in a twin-screw vessel, the total power being about 1800 indicated horse-power.

IN the same report of Lloyd's Register are described several novel features possessed by a set of internal-combustion engines which is being constructed in this country, under the society's survey, for a vessel of about 260 tons. Gas for the engines is to be produced on board from anthracite coal. The cylinders are to be of comparatively small size, and the engines are intended to run at a high rate of revolution, and will not be reversible. The connection with the screw-shaft will be made by means of a hydrodynamic transformer, in which a turbine pump driven by the engine delivers water to another turbine coupled direct to the screw-shaft. The arrangement is such that the screw-shaft will rotate at a much less rate of speed than the engines, and provision is also made for reversing its direction of rotation. The experience which will be obtained from these four applications of the internal-combustion engine is being looked forward to with great interest, and will provide data of great value.

MESSRS. E. B. ATKINSON AND CO., 24 Dock Street, Hull, have sent us a copy of their new catalogue of balances and weights. In addition to containing particulars of the balances of their own designs, the catalogue provides prices and details of all other well-known makes of balance and accessories which Messrs. Atkinson and Co. are prepared to supply.

WITH the close of the year 1909 the hundredth volume of the *Chemical News* was completed; and as these volumes cover a period of fifty years' progress in chemistry and physics, the announcement that a general index has now been prepared, and is in the press, will be widely welcomed. The price of the general index on publication will be 2*l.*, but to subscribers who order it before the date of publication the price will be 1*l.* 15*s.*

THE first part of an important work on "The Birds of Australia," by Mr. G. M. Matthews, will be issued by Messrs. Witherby and Co. next month. The author has lived all his life in Australia, and has been a devoted student of its avifauna. He has secured the active assistance of a large number of field-ornithologists in all parts of Australia, and his work will incorporate all the available information upon the subject with which it deals. There will also be hand-coloured plates depicting all the known species of Australian birds. The edition of the complete work is limited to three hundred numbered sets.

OUR ASTRONOMICAL COLUMN.

A BRIGHT PROJECTION ON SATURN.—In No. 4445 of the *Astronomische Nachrichten* Signor M. Maggini describes a brilliant projection which he observed on the west limb of Saturn at 23*h.* 36*m.* (Cent. E.M.T.) on September 29. The observation was made at the Ximeniano Observatory, Florence, with a 350 mm. Calver telescope, and the projection was seen in profile against the shadow cast by the planet on the ring. It was also seen to be near a large whitish spot at the edge of the south equatorial band. The phenomenon remained visible until the whitish spot left the terminator, and was last seen at 0*h.* 20*m.* September 30.

SPECTRUM AND RADIAL VELOCITY OF ϕ PERSEI.—The spectrum of ϕ Persei is a peculiar one, in which a dark, narrow, H γ absorption line appears to be bordered by very bright lines, and as this is the most prominent line on which radial-velocity determinations have been made, the values of the line-of-sight motion have not been in full agreement.

An investigation carried out by Dr. Ludendorff has explained some of the anomalies, and the results now appear in No. 4442 of the *Astronomische Nachrichten*. Photographs were taken at Potsdam on which other faint lines, which could be identified with solar lines in Rowlands's tables, were measurable, and the radial velocities have been determined from these independently. Among other results, Dr. Ludendorff finds that the intensities of the components of the H γ line oscillate, so that when the emission lines are faint the absorption line is strong, and *vice versa*, but he has been unable to discover any law for the complementary oscillations. The variation curves and the departures from them during several revolutions show that the conditions in the system of ϕ Persei are very complicated and unusual.

METCALF'S COMET, 1910*b*.—Observations of Metcalf's comet, made by M. Quéisset at the Juvisy Observatory, are placed on record in the October number of the *Bulletin de la Société astronomique de France*. On August 24 the comet was seen as a tenth-magnitude nebula having a well-marked condensation and a tail about 4' long in position-angle 120°; with an exposure of sixteen minutes, using a portrait lens working at *f*.3, a tail 45' long was shown on the photograph.

New elements and a daily ephemeris for this comet are published by Dr. Kobold in No. 4445 of the *Astronomische Nachrichten*. The elements give the time of perihelion passage as September 16, and, according to the ephemeris, the brightness is now slowly declining from magnitude 11.8. The comet is now travelling northward slowly through Serpens, its position for October 20 being given as $\alpha=15^{\text{h}}$. 28*m.*, $\delta=+19^{\circ}$ 12.5'.

COMETS AND ELECTRONS.—In an address to the Royal Academy of Science, Bologna, Prof. Righi discussed at length the functions of electrons in producing cometary

phenomena; this address now appears, with a French translation, in No. 16, vol. viii., of *Scientia*. Prof. Righi outlined the several theories which have been evolved to account for the various phenomena, paying special attention to the experimental proof of light-pressure, and then showed how the electrons emitted by the sun could produce ionisation, which in turn would lead to such repulsion as would cause the development of a tail. In concluding, he described the results of some experiments carried out at Bologna during the earth's passage through the tail of Halley's comet on May 19. No remarkable variations in the atmospheric potential were recorded, but a greater degree of ionisation than usual was found to exist. The existence of radiations capable of travelling through black paper to a photographic plate was also demonstrated, but this experiment alone is not considered definite enough to warrant the assumption that these radiations could be ascribed to the proximity of the cometary matter.

MEASURES OF DOUBLE STARS.—In No. 4445 of the *Astronomische Nachrichten* the measures of double stars made by Mr. Sellors at the Sydney Observatory during 1897–1900 are published. Notes appended to many of the sets of measures give important information as to changes in position-angle and distance during definite periods, &c. No double-star observations were made at Sydney during the years 1901–8.

RECENT RESULTS IN SOLAR PHYSICS.—As an extract from the *Atti della Società italiana per il progresso delle scienze* we have received a brochure in which Prof. Riccò gives a very interesting, important, and comprehensive résumé of the results obtained from the study of solar physics during recent years. After briefly summarising the earlier researches, Prof. Riccò directs attention to the importance of correlating solar and meteorological phenomena, and refers briefly to the results obtained by Meldrum, Köppen, Lockyer, Bigelow, Nordmann, and others. Then he describes the different organisations which deal with solar research, and passes on to the spectroscopic results. This leads to a long discussion of the spectroheliographic results, and finally to the knowledge obtained from eclipse work.

THE NINTH INTERNATIONAL CONFERENCE ON TUBERCULOSIS.

THE International Conference on Tuberculosis held its ninth series of sessions at Brussels on October 5–8 under the patronage of King Albert of Belgium, who throughout took a very keen interest in the conference. The first day, October 5, was devoted to the meetings of the council and to the organisation of permanent commissions, some dealing with entirely new subjects, others with subjects already under consideration. To six of these commissions are referred questions of a more or less scientific character; to another six questions in which social elements predominate.

In the first group predisposition occupies the first place. In this group also are the commissions dealing with channels of infection; milk; methods of treatment, scientific and vaccinal; international method of notation; and the action of the solar rays.

In the second group are included the part played by women in the crusade against tuberculosis; child life and school hygiene; prophylaxis and the part played by the dispensary; the cure (?) of tuberculosis; public measures to be taken against tuberculosis; and the statistics concerning tuberculosis.

On these commissions are represented, so far as possible, the different nationalities taking part in the work of the congress.

On Thursday morning, October 6, the opening ceremony of the conference was under the presidency of M. Berryer, Minister of the Interior, who in a thoughtful and well-informed address compared the Tuberculosis Congress to the great Peace Congress at the Hague, "both inspired by the same profound thought and both wishing to obtain the same results," the former, indeed, helping the latter, "the warring of man against man being gradually replaced, thanks to a more humane sentiment, by a bringing together of all men in common action against the universal ills, vice, misery, disease, and death," a sentiment that